



PATENT ABSTRACTS OF JAPAN

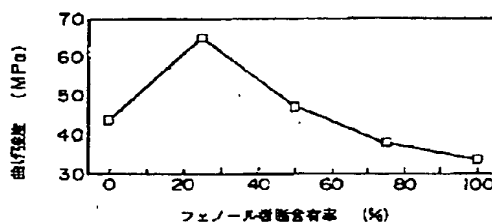
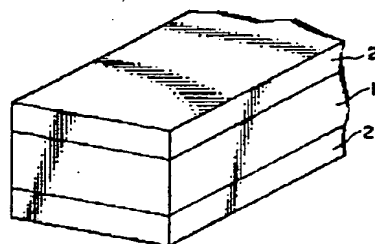
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ENDO KAZUYUKI**(54) WOOD-BASED PLATE MATERIAL****(57) Abstract:**

PURPOSE: To obtain a wood-based plate material, which is made of directional wooden flake laminated lumber and has high strength and low density.

CONSTITUTION: The wood-based plate material concerned has a core layer 1 and a surface layer 2, which is laminated onto both the sides of the core layer 1. The core layer 1 is made of at least one wooden flake laminated lumber, which is produced by bonding wooden flakes with a foamable binder and forming into an integral body. The surface layer 2 is made of a directional wooden flake laminated lumber, which is produced by bonding wooden flakes with a non-foamable binder and forming into an integral body. The foamable binder is preferably prepared by mixing the foamable resin and the non-foamable resin in the ratio of 1:4-4:1. The preferable content of the binder is set to be 5-15wt.%. Thus, the wood-based plate material having light weight and high strength can be obtained. Further, by acetylating the wooden flakes composing of the surface layer, the mothproofness, rotproofness, germproofness and dimensional stability of the wood-based plate material can be improved. The raw material, which is conventionally discharged as waste

wood, can be effectively used, resulting in allowing to contrive to reduce raw material cost.

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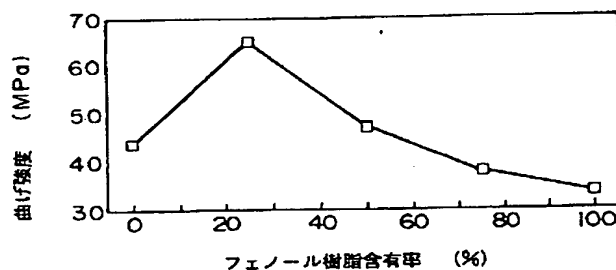
(54)【発明の名称】 木質板材

(57)【要約】

【目的】 方向性木材薄片集成板からなり、高強度で低密度の木質板材を得る。

【構成】 芯層と、その芯層の両表面に積層される表層とを有し、その芯層が、木材薄片を発泡性バインダーを用いて接着し成形一体化した少なくとも1枚の木材薄片集成板からなり、表層が、木材薄片を非発泡性バインダーを用いて接着し成形一体化した方向性木材薄片集成板からなる木質板材。その発泡性バインダーは、発泡性樹脂と非発泡性樹脂を1:4~4:1の比率で混合してなるのが好ましい。また、バインダー含有量は、5~15重量%とするのが好ましい。

【効果】 軽量、高強度の木質板材を得ることができる。また、表層をなす木材薄片をアセチル化することにより、木質板材の防虫、防腐、防バイ菌性、及び寸法安定性を向上させることができ、従来廃材とされていた原料を有効利用でき、原料コストの削減も図ることができる。



【特許請求の範囲】

【請求項1】 芯層と、その芯層の両表面に積層される表層とを有し、その芯層が、木材薄片を発泡性バインダーを用いて接着し成形一体化した少なくとも1枚の木材薄片集成板からなり、表層が、木材薄片を非発泡性バインダーを用いて接着し成形一体化した方向性木材薄片集成板からなることを特徴とする木質板材。

【請求項2】 前記発泡性バインダーが、発泡性樹脂と非発泡性樹脂とを、4:1~1:4の比率で混合してなることを特徴とする請求項1記載の木質板材。

【請求項3】 前記発泡性バインダーに含まれる樹脂の含有量が、その発泡性バインダーと芯層をなす木材薄片の合計重量に対して、5~15重量%であり、前記非発泡性バインダーに含まれる樹脂の含有量が、その非発泡性バインダーと表層をなす木材薄片の合計重量に対して、5~15重量%であることを特徴とする請求項1記載の木質板材。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は木質板材に関し、特に、木材薄片をバインダーを用いて接着し成形一体化した方向性木材薄片集成板を複数枚積層した木質板材に関する。

【0002】

【従来の技術】近年、木材資源の不足や、森林の保護が問題となってきており、森林伐採は今後益々困難になることは明らかである。従って、ベニヤ単板等の複数枚を接着積層してなり、原料木材を大量に使用して製造される合板は、その供給が不安定あるいは供給不足となり、それにともなう、従来合板を使用していた床材等は、材料不足あるいは材料コストの高騰により、製造が困難になることが予想される。

【0003】そこで、従来廃材とされていた木材薄片や、木材片の木質繊維等を有効に利用して得られる木質板材が目ざされ、従来合板を使用していた分野への応用が期待されている。このような木質板材はオリエンテッド・ストランド・ボード(OSB)と呼ばれ、一般に、木材薄片等の構成要素を非発泡性バインダーを用いて接着し成形一体化して形成される。従って、成形用の金型を変えることにより、要求される寸法、形状の材料を比較的容易に得ることができ、構成要素を改質したり、添加剤を加えてから成形することにより、防虫性、防霉性、難燃性等を向上させ、天然の木材にない特徴をもたせることもできる。

【0004】しかしながら、このような木質板材は、天然の木材に比較すると強度が低く、また、天然の木材が気孔等の空隙を内在しているのに対して、構成要素の周囲を非発泡性バインダーで固めてなるこれらの木質板材は、その密度が高くなる傾向があった。よって、木質板材の強度を保つために板厚を厚くすると、高密度である

ため重量が増加し、取扱い難くなるという問題があった。

【0005】また、従来の木質板材では、樹脂比率で約2重量%(以下、バインダーの重量%は、そのバインダーに含まれる樹脂の板材に対する重量%とする)の非発泡性バインダーを用いて木材薄片等を成形一体化していたが、密度を低下させるためにバインダー量を減少させると、得られる木質板材の強度はさらに低下し、逆に、バインダー量を増加させると、密度が増加し、木質感が損なわれるという問題を生じていた。一方、熱圧プレス of プレス時間を短くするために、木材薄片を発泡性バインダーを用いて成形一体化し、その発泡性バインダーの発泡により板材内部に空隙を持たせた木質板材では、比重低下の効果は十分得られるが、強度向上の点では十分でないこともあった。

【0006】

【発明が解決しようとする課題】よって、本発明における課題は、木材薄片をバインダーで成形一体化した方向性木材薄片集成板からなり、十分な強度を有し、なおかつ低密度の木質板材を提供することにある。

【0007】

【課題を解決するための手段】かかる課題は、芯層と、その芯層の両表面に積層される表層とを有し、その芯層が、木材薄片を発泡性バインダーを用いて接着し成形一体化した少なくとも1枚の木材薄片集成板からなり、表層が、木材薄片を非発泡性バインダーを用いて接着し成形一体化した方向性木材薄片集成板からなる木質板材によって解決できる。

【0008】以下に、本発明の木質板材を詳細に説明する。図1は、本発明の木質板材の一例を示す図であり、図中1は、発泡性バインダーを用いて成形一体化された1枚の方向性木材薄片集成板からなる芯層であり、その芯層1の両面には、非発泡性バインダーを用いて成形一体化された方向性木材薄片集成板からなる表層2が積層された3層積層構造をなしている。

【0009】ここで、方向性木材薄片集成板とは、木材薄片の木目方向を一方に配列させて集積し成形一体化した木質板材を意味する。ただし、その方向性木材薄片集成板をなす木材薄片全てが一方に配列されている必要はなく、およそ7割以上の木材薄片の木目方向が一方に配列されていればよい。

【0010】本発明の木質板材の芯層1を形成する木材薄片集成板にあつては、木材薄片は発泡性バインダーで接着され成形一体化されている。ここで用いられる発泡性バインダーは、表層1中で木材薄片を相互に結合させているとともに、それ自体が発泡しているものであつて、好ましくは、木材薄片同士の交差点にのみ樹脂分を存在させ、木材薄片の小さな隙間を、発泡セルで押し広げるようにすることにより、樹脂分の使用量を少なくし、芯層を低密度化させるものが用いられる。

【0011】本発明で用いられる発泡性バインダーは、発泡性樹脂と、非発泡性樹脂を混合してなるものが好ましい。これらの混合比は、目的とする木質板材の密度等に応じて適宜調整することができるが、発泡性樹脂と非発泡性樹脂の混合比は、1:4~4:1とするのが好ましい。発泡性樹脂の含有量を1/5以下あるいは4/5以上とすると、得られる木質板材の曲げ強度が低下する。

【0012】ここで、上記発泡性樹脂は、自己発泡する樹脂から構成されていてもよく、または非発泡性の樹脂と発泡剤とで構成されていてもよい。自己発泡する樹脂の例としては、発泡性ポリウレタン樹脂を挙げることができる。発泡剤によって発泡する非発泡性樹脂の例としては、ポリウレタン樹脂、ポリスチレン樹脂、エポキシ樹脂、ポリ塩化ビニル樹脂、フェノール樹脂、ユリア樹脂またはそれらの混合物などを挙げることができる。また、発泡剤としては、例えばCCl₄、F₂、CCl₂F₂、またはCCl₂F-CF₃などの揮発性発泡剤や、例えばアゾジカルボンアミド、アゾヘキサヒドロベンゾニトリル、2, 2'-アゾイソプロチロニトリル、ベンゼンスルホヒドラジド、またはN, N'-ジニトロソ-N, N'-ジメチルテレフタルアミドなどの熱分解性発泡剤を挙げることができる。

【0013】また、上記発泡性樹脂と混合する非発泡性樹脂の例としては、ユリア樹脂、メラミン樹脂、フェノール樹脂、ポリスチレン樹脂、エポキシ樹脂、ポリ塩化ビニル樹脂またはそれらの混合物等を挙げることができる。

【0014】この芯層に用いられる木材薄片は、長さが50~75mm、幅が6~50mm、厚さが0.1~0.8mmの範囲内であることが好ましく、アカマツ、カラマツ、エゾマツ、トドマツ、アスペン、ロッジポールパイン等の薄片が好適に用いられるが、樹種は特に限られるものではない。また、芯層1においては、木材薄片の木目方向が必ずしも一定方向に配列されている必要はなく、ランダム配列であってもよい。

【0015】本発明の木質板の表層2を形成する方向性木材薄片集成板にあっては、木材薄片が非発泡性バインダーで接着され、成形一体化されている。ここで用いられる非発泡性バインダーは、上述したような非発泡性樹脂単独からなるものが好ましいが、発泡性樹脂を含むものでもよい。しかし、成形用金型からの離型性の点で、非発泡性バインダーを主体とするものが好ましい。それらの混合比は、目的とする表層の密度と離型性を考慮して、適宜設定することができる。

【0016】この表層2をなす木材薄片は、長さが50~100mm、幅が6~100mm、厚さが0.1~0.8mmのものが好適に用いられる。さらに、この木材薄片は、厚さが0.3mm以下であると、得られる木質板の表面平滑性がさらに向上するので好ましい。この

木材薄片としては、アカマツ、カラマツ、エゾマツ、トドマツ、アスペン、ロッジポールパイン等の薄片が好適に用いられるが、樹種は特に限られるものではない。

【0017】この表層2を形成する木材薄片は、予めアセチル化しておくのが好ましい。この木材薄片をアセチル化する場合は、木材薄片を含水率3%以下、好ましくは1%以下になるまで乾燥した後、酢酸、無水酢酸、クロル酢酸等の気化蒸気に接触させて気相中でアセチル化（アセチル化度12~20%）するのが好ましい。

【0018】また、本発明の木質板材の芯層及び表層をなす木材薄片に塗布する発泡性バインダーあるいは非発泡性バインダーの量は、各層の木材薄片とバインダーの合計重量に対して5~15重量%とするのが好ましい。バインダーの量が5重量%未満だと木質板材の強度が低下し、15重量%より多くしても強度向上の効果は向上せず、密度が増大して木質感も損なわれる。

【0019】本発明の木質板材では、芯層の両面に同種の方向性木材薄片集成板からなる表層を積層するのが好ましい。また、表層の厚みは表裏同厚にするのが好ましいが、芯層の厚みと表層の厚み（表裏の厚みの和）の比率は、特に限られず、例えば、表層をなす木材薄片の配列方向での強度を向上させる場合には、表層を厚くするのが好ましい。さらに、芯層及び表層をなす木材薄片の配列方向は、互いに直行するように配列させるのが好ましい。また、本発明にあっては、芯層をなす木材薄片に発泡性バインダーを塗布したものと、表層をなす木材薄片に非発泡性バインダーを塗布したものを乾式フォーミングし、表層と芯層とを同時熱圧成形するのが好ましい。

【0020】具体的には、まず、熱圧板上に、一方の表層2となる木材薄片に非発泡性バインダーを塗布したものを、その配列方向がほぼ一定になるように散布し、次に、芯層1をなす木材薄片に発泡性バインダーを塗布したものを、その木材薄片の配列方向が表層2をなす木材薄片の配列方向と直行するようにして散布する。さらに、他方の表層2をなす木材薄片に非発泡性バインダーを塗布したものを、最初に散布した表層2をなす木材薄片の配列方向と平行になるように配列させて散布し、3層積層体とする。

【0021】次に、熱圧成形機中でこの3層積層体に熱圧を加えて熱圧同時成形する。その熱圧条件は、圧力が1~2MPa、温度が150~200℃、時間が、目的とする厚み(mm)×5~120秒とすることが好ましい。

【0022】上記の説明では、1枚の方向性木材薄片集成板からなる芯層の両面に、表層をなす方向性木材薄片集成板を積層した3層積層構造の木質板材について述べたが、本発明はそれに限られることはなく、例えば、3枚の方向性木材薄片集成板を積層してなる芯層と、その両面に形成した表層の、合計5層積層構造等にと

もできる。その場合にも、積層数によらず、隣接する方向性木材薄片集成板同士の木材薄片の配列方向は、互いに直行するように配列させるのが好ましい。

【0023】本発明の木質板材において、芯層及び表層をなす方向性木材薄片集成板は、木材薄片がほぼ同一方向に配列されているため、特にその配列方向の曲げ強度が向上する。また、特に芯層の方向性木材薄片集成板においては、発泡性バインダーを用いて成形一体化しており、その発泡性バインダーは、発泡性樹脂と非発泡性樹脂を所定の混合比で混合してなるものであるため、得られる木質板材の密度は低くなり、大きな曲げ強度を有する。さらに、本発明の木質板材においては、表層が非発泡性バインダーを用いて成形一体化されているので、成形用金型からの離型性が優れており、離型処理が不要となる。

【0024】次に本発明の木質板材を実施例に基づいて具体的に説明する。

(実施例1) 長さが50~75mm、幅が6~50mm、厚さが0.1~0.8mmであるアスペンの薄片を、シェーピングマシン(株)岩倉組製で作製した。発泡性ウレタン樹脂(44V20、住友バイエル社製)と非発泡性の水性エマルジョン形フェノール樹脂の重量比を0:100、25:75、50:50、75:25及び100:0に変化させた5種類のバインダー混合物を、各々20重量部用意した。次に、低速で回転する回転ドラム内に、上記の木材薄片100重量部を入れて、ドラム内で自然落下する際にスプレーにより散布することにより、木材薄片に5種類のバインダー混合物を塗布した。

【0025】まず、5種類のバインダー混合物を塗布した木材薄片を、表層/芯層/表層の積層体となるように熱圧板上に散布し、温度160℃、圧力2MPaで20分間熱圧同時成形して5種類の木質板材を作製した。作製した各々の木質板材につき、その曲げ強度をJISに基づいて測定した。結果を図2に示す。図中、横軸は、バインダー混合物中のフェノール樹脂の含有比率を示している。バインダー混合物中の非発泡性樹脂の比率が、およそ25%の点をピークとして、それより多い場合も、少ない場合も、曲げ強度は低下する傾向がみられる。特に、非発泡性樹脂の含有率が25%以下では、曲げ強度は35MPaを下回っている。

【0026】(実施例2) 長さが50~75mm、幅が6~50mm、厚さが0.1~0.8mmであるアスペンの薄片を、シェーピングマシン(株)岩倉組製で作製した。発泡性ウレタン樹脂(44V20、住友バイエル社製)と非発泡性の水性エマルジョン形フェノール樹脂の2:1混合物からなる発泡性バインダーを用意し、低速で回転する回転ドラム内に、上記の木材薄片100重量部を入れて、ドラム内で自然落下する際にスプレーにより散布することにより、表層用の木材薄片にバ

インダーを塗布した。その際、塗布する発泡性バインダーの量を、3~18重量%まで変化させた。

【0027】バインダーを塗布した木材薄片を、表層/芯層/表層の積層体となるように熱圧板上に散布し、厚さ12mmとなるように、温度160℃、圧力2MPaで20分間熱圧同時成形して、バインダー量の異なる6種類の木質板材を作製した。それら6種類の木質板材につき、曲げ強度を測定した。結果を図3に示す。測定した範囲では、バインダー量を増加させると曲げ強度が増大する傾向がみられた。しかし、バインダー含有量がおよそ12%を越えると、バインダー量を増加させても、その値はほとんど改善されないことがわかった。

【0028】(実施例3) 芯層をなす方向性木材薄片集成板の材料として、長さが50~75mm、幅が6~50mmであるアスペンの薄片を、シェーピングマシン(株)岩倉組製で作製した。発泡性ウレタン樹脂(44V20、住友バイエル社製)と非発泡性の水性エマルジョン形フェノール樹脂の重量比2:1の混合物からなる発泡性バインダー12重量部を用意し、低速で回転する回転ドラム内に、上記の木材薄片88重量部を入れて、ドラム内で自然落下する際にスプレーにより散布することにより、芯層用の木材薄片に発泡性バインダーを塗布した。

【0029】表層をなす方向性木材薄片集成板の材料として、長さが50~100mm、幅が6~100mmであるアスペンの薄片を、シェーピングマシン(株)岩倉組製で作製した。非発泡性の水溶性フェノール樹脂12重量部を用意し、低速で回転する回転ドラム内に、上記の木材薄片88重量部を入れて、ドラム内で自然落下する際にスプレーにより散布することにより、表層用の木材薄片にバインダーを塗布した。

【0030】まず、非発泡性バインダーを塗布した表層用の木材薄片のうちの半分を、熱圧板上にほぼ一定方向に配列して散布し、その上に、発泡性バインダーを塗布した芯層用の木材薄片を、木材薄片の配列方向が表層用の木材薄片の配列方向と直行する方向になるように散布した。さらにその上に、残りの表層用の木材薄片を最初に散布した表層用の木材薄片と同方向に配列して散布し、3層の積層体とした。その積層体を、温度160℃、圧力2MPaで20分間熱圧同時成形した。得られた木質板材の厚みは12mmであり、密度は0.61g/cm³であった。

【0031】(実施例4) 実施例3で作製した本発明の木質板材の曲げ強度及び曲げヤング係数を測定した。曲げ強さに関しては、JIS-A5908に基づいて評価した。結果を表1に示す。

【0032】(比較例1) 実施例3と同じ厚みを有する合板(密度0.58g/cm³)について、実施例4と同様の測定を行った。結果を表1に示す。

【0033】(比較例2) 木材薄片を2重量%の非発泡

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性バインダーで成形一体化した従来の方向性木材薄片集成板であって、実施例 3 の木質板材と同じ厚みの方向性木材薄片集成板について、実施例 4 と同様の測定を行った。結果を表 1 に示す。

【 0 0 3 4 】 (比較例 3) 実施例 3 の木質板材と同じ厚

【表 1】

| | 実施例 4 | 比較例 1 | 比較例 2 | 比較例 3 |
|---------------|------------------|------------------|------------------|------------------|
| 曲げ強度 (MPa) | 5 8 | 4 6 | 4 3 | 4 2 |
| 曲げヤング係数 (MPa) | 64×10^2 | 54×10^2 | 56×10^2 | 35×10^2 |

これらの結果から、本発明の木質板材が、従来の合板、方向性木材薄片集成板、木質繊維集成板を凌ぐ曲げ強度を有していることがわかる。

【 0 0 3 6 】 (実施例 5) 芯層をなす方向性木材薄片集成板を成形する発泡性バインダーを、非発泡性樹脂である水溶性フェノール樹脂と、発泡性バインダーであるウレタン樹脂 (4 4 V 2 0 、住友バイエル社製) との 1 :

1 混合物とした以外は、実施例 3 と同様にして、3 層積

【表 2】

| | 実施例 3 | 実施例 5 | 比較例 1 | 比較例 2 | 比較例 3 |
|----|-----------|-----------|-----------|-----------|-----------|
| 平面 | 5 3 k g 重 | 5 6 k g 重 | 4 4 k g 重 | 5 3 k g 重 | 4 6 k g 重 |
| 木口 | 3 6 k g 重 | 3 5 k g 重 | 3 4 k g 重 | 2 1 k g 重 | 3 2 k g 重 |

これらの結果から、本発明の木質板材は、従来の板材に比較して、同等もしくはそれ以上の大きなビス保持力を有していることがわかる。

【 0 0 3 9 】 (実施例 7) 実施例 3 及び実施例 5 で作製した本発明の木質板材につき、曲げたわみの値を J A S 「フローリング」に基づいて行った。例えば、床材の J A S 規格では、この曲げたわみの値が 3 . 5 mm 以下である必要がある。その結果、実施例 3 の木質板材の曲げたわみは 3 . 0 mm、実施例 5 の木質板材の曲げたわみは 3 . 3 mm であり、いずれも J A S の床材規格を満たしていることがわかった。

【発明の効果】本発明の木質板材は、木材薄片を発泡性バインダーを用いて成形一体化した木材薄片集成板からなる芯層と、その両面に、木材薄片を非発泡性バインダーを用いて成形一体化した方向性木材薄片集成板からなる表層を積層したものであるため高強度であり、低密度化することができ、軽量、高強度の木質板材を得ることができる。また、本発明の木質板材は、発泡性バインダーとして、発泡性樹脂と非発泡性樹脂を特定の比率で混合したバインダーを使用し、さらにバインダーの含有量

みを有する中密度木質繊維集成板 (密度 0 . 7 0 g / c m³) について、実施例 4 と同様の測定を行った。結果を表 1 に示す。

【 0 0 3 5 】

層した厚み 1 2 mm の木質板材を作製した。

【 0 0 3 7 】 (実施例 6) 実施例 3 及び実施例 5 で作製した本発明の木質板材と、比較例 1 ~ 3 の合板、方向性木材薄片集成板、及び木質繊維集成板につき、平面方向と木口方向のビス保持力を J I S に基づいて測定した。結果を表 2 に示す。

【 0 0 3 8 】

を所定の範囲内にすることにより、高い曲げ強度を保つことができ、従来合板が使用されていた用途への応用も可能である。さらに、表層をなす木材薄片をアセチル化することにより、木質板材の防虫、防腐、防バイ菌性、及び寸法安定性を向上させることができる。本発明の木質板材によれば、従来廃材とされていた原料を有効利用でき、木材資源を保護する効果がある。また、そのような原料は低価格であり、原料コストの削減も図ることができる。

【図面の簡単な説明】

【図 1】 本発明の木質板材の一例を示す斜視図である。

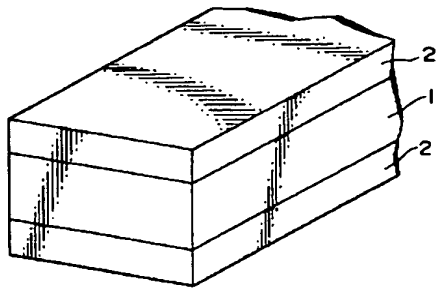
【図 2】 バインダーの組成とそのバインダーを用いて得られた木質板材の曲げ強度との関係を示すグラフである。

【図 3】 バインダーの含有量とそのバインダーを用いて得られた木質板材の曲げ強度との関係を示すグラフである。

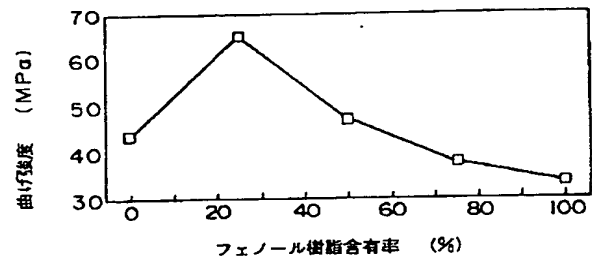
【符号の説明】

1 … 芯層、2 … 表層

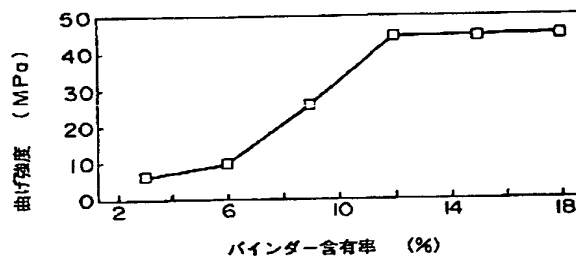
【図 1】



【図 2】



【図 3】



フロントページの続き

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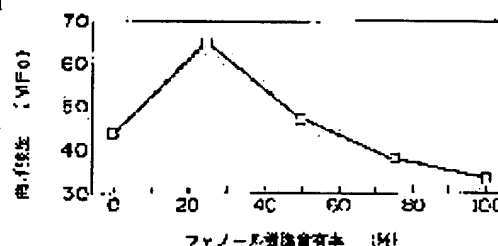
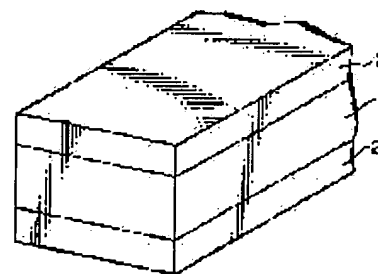
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(54) WOOD-BASED PLATE MATERIAL

(57)Abstract:

PURPOSE: To obtain a wood-based plate material, which is made of directional wooden flake laminated lumber and has high strength and low density.

CONSTITUTION: The wood-based plate material concerned has a core layer 1 and a surface layer 2, which is laminated onto both the sides of the core layer 1. The core layer 1 is made of at least one wooden flake laminated lumber, which is produced by bonding wooden flakes with a foamable binder and forming into an integral body. The surface layer 2 is made of a directional wooden flake laminated lumber, which is produced by bonding wooden flakes with a non-foamable binder and forming into an integral body. The foamable binder is preferably prepared by mixing the foamable resin and the non-foamable resin in the ratio of 1:4-4:1. The preferable content of the binder is set to be 5-15wt.%. Thus, the wood-based plate material having light weight and high strength can be obtained. Further, by acetylating the wooden flakes composing of the surface layer, the mothproofness, rotproofness, germproofness and dimensional stability of the wood-based plate material can be improved. The raw material, which is conventionally discharged as waste wood, can be effectively used, resulting in allowing to contrive to reduce raw material cost.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] About a woody plate, especially, this invention pastes up a wood flake using a binder, and relates to the woody plate which carried out two or more sheet laminating of the directivity wood flake collection board which carried out forming unification.

[0002]

[Description of the Prior Art] In recent years, shortage of wood resources and protection of a forest pose a problem, and the deforestation of a bird clapper is clearer difficult future still. Therefore, as for the flooring with which the plywood was being conventionally used for the plywood which comes to carry out the adhesion laminating of two or more sheets, such as a veneer, and is manufactured, using raw material wood in large quantities in connection with it by the supply serving as instability or short supply, a bird clapper is expected for manufacture by the jump of a material shortage or material cost difficult.

[0003] Then, the woody plate obtained using effectively the wood flake conventionally used as scrap wood, the woody fiber of the piece of wood, etc. attracts attention, and the application to the field which was using the plywood conventionally is expected. Such a woody plate is called oriented strand board (OSB), generally it pastes up the component of a wood flake etc. using an un-foaming nature binder, carries out forming unification, and is formed. Therefore, by changing the metal mold for fabrication, by fabricating, after it can obtain comparatively easily the material of the size and configuration which are demanded, and reforming a component or adding an additive, insect control nature, antiseptis nature, fire retardancy, etc. can be raised, and the feature it is featureless in natural wood can also be given.

[0004] However, as for these woody plates to which such a woody plate comes to harden the circumference of a component with an un-foaming nature binder to natural wood being inherent in openings, such as pore, low [intensity] as compared with natural wood, the density tended to have become high. Therefore, in order to maintain the intensity of a woody plate, when board thickness was thickened, since it was high-density, the weight increased, and there was a problem of being hard coming to deal with it.

[0005] Moreover, although the forming unification of the wood flake etc. was carried out in the conventional woody plate using about 2% of the weight (weight % of a binder is hereafter taken as weight % to the plate of the resin contained in the binder) of the un-foaming nature binder by the resin ratio Conversely, the intensity of the woody plate which will be obtained if the amount of binders is decreased in order to reduce density fell further, and when the amount of binders was made to increase, density increased, and it had produced the problem that a feeling of wood quality was spoiled. On the other hand, although the effect of a specific gravity fall was enough acquired in the woody plate which used the foaming nature binder, carried out the forming unification of the wood flake, and gave the opening to the interior of a plate by foaming of the foaming nature binder in order to shorten press time of a hot press, in respect of the improvement in on the strength, it was not sometimes enough.

[0006]

[Problem(s) to be Solved by the Invention] therefore -- from the directivity wood flake collection board to which the technical problem in this invention carried out the forming unification of the wood flake with the binder -- becoming -- sufficient intensity -- having -- in addition -- and it is in offering the woody plate of low density

[0007]

[Means for Solving the Problem] This technical problem is solvable with the woody plate which it has a core layer and the surface by which a laminating is carried out to both the front faces of the core layer, and the core layer consists of at least one wood flake collection board which pasted up the wood flake using the foaming nature binder, and carried out forming unification, and consists of a directivity wood flake collection board which the surface pasted up the wood flake using the un-foaming nature binder, and carried out forming unification.

[0008] Below, the woody plate of this invention is explained in detail. Drawing 1 is drawing showing an example of the woody plate of this invention, and one in drawing is a core layer which consists of one directivity wood flake collection board by which forming unification was carried out using the foaming nature binder, and is making the three-layer laminated structure to which the laminating of the surface 2 which becomes both sides of the core layer 1 from the directivity wood flake collection board by which forming unification was carried out using the un-foaming nature binder was carried out.

[0009] Here, on the other hand, a directivity wood flake collection board makes ** arrange the direction of grain of a wood flake, and it is accumulated and it means the woody plate which carried out forming unification. However, on the other hand, all the wood flakes that form the directivity wood flake collection board do not need to be arranged by **, and, on the other hand, the direction of grain of about 70 percent or more of a wood flake should just be arranged by **.

[0010] If it is in the wood flake collection board which forms the core layer 1 of the woody plate of this invention, the forming unification of the wood flake is pasted up and carried out with the foaming nature binder. While the foaming nature binder used here is combining the wood flake mutually in a surface 1, itself is foaming, preferably, the amount of the pitch used is lessened by making a pitch exist only in the crossing of wood flakes, and extending the small crevice between wood flakes in a foaming cell, and the thing which makes a core layer form into low density is used.

[0011] The foaming nature binder used by this invention has the desirable thing which comes to mix an un-foaming nature resin with a foaming nature resin. Although these mixing ratios can be suitably adjusted according to the density of the woody plate made into the purpose etc., as for the mixing ratio of a foaming nature resin and an un-foaming nature resin, being referred to as 1:4-4:1 is desirable. If foaming nature resins content is made into 1/5 or less and 4/5 or more, the flexural strength of the woody plate obtained will fall.

[0012] Here, the above-mentioned foaming nature resin may consist of resins which carry out self-foaming, or may consist of the resins and foaming agents of un-foaming nature. A foaming nature polyurethane resin can be mentioned as an example of the resin which carries out self-foaming. As an example of the un-foaming nature resin to which it foams with a foaming agent, a polyurethane resin, polystyrene resin, an epoxy resin, a polyvinyl chloride resin, phenol resin, urea resins, or those mixture can be mentioned. Moreover, as a foaming agent, it is volatile foaming agents, such as CCl₃F, CCl₂F₂, or CCl₂F-ClF₂, for example, an AZOJI carvone amide and azohexahydrobenzonitrile, 2, 2'-azo-isobutyro-dinitrile, a benzene sulfohydrazide or N, and N'-dinitroso, for example. - Pyrolysis nature foaming agents, such as N and N'-dimethylterephthalamide, can be mentioned.

[0013] Moreover, as an example of the un-foaming nature resin mixed with the above-mentioned foaming nature resin, a urea resin, melamine resin, phenol resin, polystyrene resin, an epoxy resin, polyvinyl chloride resins, or those mixture can be mentioned.

[0014] Although it is desirable that length is within the limits 6-50mm and whose thickness 50-75mm and width of face are 0.1-0.8mm as for the wood flake used for this core layer and flakes, such as a Japanese red pine, a larch, *Picea jezoensis*, *Abies sachalinensis*, Aspen, and a lodge pole pineapple, are used suitably, especially tree species are not restricted. Moreover, in a core layer 1, the direction of grain of a wood flake does not necessarily need to be arranged in the fixed direction, and may be a random array.

[0015] If it is in the directivity wood flake collection board which forms the surface 2 of the woody board of this invention, with the un-foaming nature binder, a wood flake pastes up and forming unification is carried out. Although what consists of an un-foaming nature resin independent which was mentioned above is desirable as for the un-foaming nature binder used here, it may contain a foaming nature resin. however, fabrication -- public funds -- what makes an un-foaming nature binder a subject is desirable in respect of the mold-release characteristic from type Those mixing ratios can be suitably set up in consideration of the surface density and the surface mold-release characteristic which are made into the purpose.

[0016] As for the wood flake which makes this surface 2, that 6-100mm and whose thickness 50-100mm and width of face are 0.1-0.8mm for length is used suitably. Furthermore, since the surface smooth nature of this wood flake of the woody board obtained as thickness is 0.3mm or less improves further, it is desirable. As this wood flake, although flakes, such as a Japanese red pine, a larch, *Picea jezoensis*, *Abies sachalinensis*, Aspen, and a lodge pole pineapple, are used suitably, especially tree species are not restricted.

[0017] As for the wood flake which forms this surface 2, acetylating beforehand is desirable. When acetylating this wood flake, it is desirable to contact a wood flake with evaporation steams, such as an acetic acid, an acetic anhydride, and a crawl acetic acid, and to acetylate it in a gaseous phase, after drying 3% or less of water contents until it becomes 1% or less preferably (the 12 - 20% of the degrees of acetylation).

[0018] Moreover, as for the amount of the foaming nature binder applied to the wood flake which makes the core layer and surface of a woody plate of this invention, or an un-foaming nature binder, it is desirable to consider as 5 - 15 % of the weight to the sum total weight of the wood flake and binder of each class. If the amount of a binder is less than 5 % of the weight, even if the intensity of a woody plate will fall and it will make [more] it than 15 % of the weight, the effect of the improvement in on the strength does not improve, but density increases, and a feeling of wood quality is also spoiled.

[0019] In the woody plate of this invention, it is desirable to carry out the laminating of the surface which becomes both sides of a core layer from a directivity wood flake collection board of the same kind. Moreover, although front-***** (ing) is desirable as for surface thickness, when raising the intensity in the array direction of the wood flake which is not restricted, for example, makes a surface, it is desirable [especially the ratio of the thickness of a core layer, and surface thickness (sum of the thickness of the front reverse side)] to thicken a surface. Furthermore, as for the array direction of the wood flake which makes a core layer and a surface, it is desirable to make it arrange so that it may go direct mutually. Moreover, if it is in this invention, it is desirable to carry out dry type forming of what applied the foaming nature binder to the wood flake which makes a core layer, and the thing which applied the un-foaming nature binder to the wood flake which makes a surface, and to carry out simultaneous interweaving of a surface and the core layer by heating under pressure.

[0020] as the array direction of the wood flake goes direct with the array direction of the wood flake which makes a surface 2,

it sprinkles what applied the foaming nature binder to the wood flake which sprinkles what applied the un-foaming nature binder to the wood flake which specifically serves as one surface 2 on a heat-and-pressure board first so that the array direction may become about 1 law, next makes a core layer 1 Furthermore, it is made to arrange so that it may become the array direction of a wood flake and parallel which make the surface 2 which sprinkled first what applied the non-foaming binder to the wood flake which makes the surface 2 of another side, sprinkles, and considers as a three-layer layered product. [0021] Next, heat-and-pressure simultaneous fabrication of the heat and pressure is applied and carried out by the interweaving [by heating under pressure] in a plane at this three-layer layered product. As for the heat-and-pressure condition, it is desirable that a pressure considers as thickness (mm) x 5 - 120 seconds which 1 - 2MPa and temperature make 150-200 degrees C, and time makes the purpose.

[0022] this invention can also be made into a total of five-layer laminated structure of the core layer which is not restricted to it, for example, comes to carry out the laminating of the three directivity wood flake collection boards, and the surface formed in the both sides etc. although the above-mentioned explanation described the woody plate of the three-layer laminated structure which carried out the laminating of the directivity wood flake collection board which makes a surface to both sides of the core layer which consists of one directivity wood flake collection board. Also in such a case, it is not based on the number of laminatings, but, as for the array direction of the wood flake of adjoining directivity wood flake collection boards, it is desirable to make it arrange so that it may go direct mutually.

[0023] In the woody plate of this invention, since the wood flake is mostly arranged in the same direction, the flexural strength of the directivity wood flake collection board which makes a core layer and a surface of the array direction improves especially. Moreover, in the directivity wood flake collection board of a core layer, forming unification is especially carried out using the foaming nature binder, and since the foaming nature binder is a thing which comes to mix a foaming nature resin and an un-foaming nature resin with a predetermined mixing ratio, the density of the woody plate obtained becomes low and has big flexural strength. furthermore -- since the forming unification of the surface is carried out in the woody plate of this invention using the un-foaming nature binder -- fabrication -- public funds -- the mold-release characteristic from type is excellent, and mold release processing becomes unnecessary

[0024] Next, the woody plate of this invention is concretely explained based on an example.

(Example 1) Length produced the flake of Aspen 6-50mm and whose thickness 50-75mm and width of face are 0.1-0.8mm by the shaving machine (Product made from the Iwakura Group). 20 weight sections preparation of five kinds of binder mixture which changed the weight ratio of a foaming nature urethane resin (44V20, the Sumitomo Beyer company make) and the water emulsion type phenol resin of un-foaming nature to 0:100, 25:75, 50:50, 75:25, and 100:0 was carried out respectively. Next, when putting in the above-mentioned wood flake 100 weight section in the rotating drum rotated at a low speed and carrying out natural fall within a drum, five kinds of binder mixture was applied to the wood flake by sprinkling with a spray. [0025] First, the wood flake which applied five kinds of binder mixture was sprinkled on the heat-and-pressure board so that it might become the layered product of a surface / core layer / surface, heat-and-pressure simultaneous-for 20 minutes fabrication was carried out by the temperature of 160 degrees C, and pressure 2MPa, and five kinds of woody plates were produced. The flexural strength was measured about each produced woody plate based on JIS. A result is shown in drawing 2. The horizontal axis shows the content ratio of the phenol resin in binder mixture among drawing. The inclination, as for flexural strength, for the ratio of the un-foaming nature resin in binder mixture to fall with a peak of about 25% of point when [than it] more, and when few is seen. As for especially flexural strength, the content of an un-foaming nature resin is less than 35MPa(s) at 25% or less.

[0026] (Example 2) Length produced the flake of Aspen 6-50mm and whose thickness 50-75mm and width of face are 0.1-0.8mm by the shaving machine (Product made from the Iwakura Group). When preparing the foaming nature binder which consists of 2:1 mixture of a foaming nature urethane resin (44V20, the Sumitomo Beyer company make) and the water emulsion type phenol resin of un-foaming nature, putting in the above-mentioned wood flake 100 weight section in the rotating drum rotated at a low speed and carrying out natural fall within a drum, the binder was applied to the wood flake for surfaces by sprinkling with a spray. The amount of the foaming nature binder to apply was changed to 3 - 18 % of the weight in that case.

[0027] Heat-and-pressure simultaneous-for 20 minutes fabrication was carried out by the temperature of 160 degrees C, and pressure 2MPa, and six kinds of woody plates from which the amount of binders differs were produced so that the wood flake which applied the binder might be sprinkled on a heat-and-pressure board so that it may become the layered product of a surface / core layer / surface, and it might become 12mm in thickness. Flexural strength was measured about these six kinds of woody plates. A result is shown in drawing 3. In the measured range, when the amount of binders was made to increase, the inclination for flexural strength to increase was seen. However, when the binder content exceeded about 12%, even if it made the amount of binders increase, it turns out that most of the value does not improve.

[0028] (Example 3) As a material of the directivity wood flake collection board which makes a core layer, the flake of Aspen whose width of face length is 50-75mm and is 6-50mm was produced by the shaving machine (Product made from the Iwakura Group). When preparing the foaming nature binder 12 weight section which consists of mixture of the weight ratio 2:1 of a foaming nature urethane resin (44V20, the Sumitomo Beyer company make) and the water emulsion type phenol resin of un-foaming nature, putting in the above-mentioned wood flake 88 weight section in the rotating drum rotated at a low speed and carrying out natural fall within a drum, the foaming nature binder was applied to the wood flake for core layers by sprinkling with a spray.

[0029] As a material of the directivity wood flake collection board which makes a surface, the flake of Aspen whose width of face length is 50-100mm and is 6-100mm was produced by the shaving machine (Product made from the Iwakura Group). When preparing the water-soluble phenol resin 12 weight section of un-foaming nature, putting in the above-mentioned wood flake 88 weight section in the rotating drum rotated at a low speed and carrying out natural fall within a drum, the binder was applied to the wood flake for surfaces by sprinkling with a spray.

[0030] First, the half of the wood flakes for surfaces which applied the un-foaming nature binder was arranged and sprinkled in the simultaneously fixed direction on the heat-and-pressure board, and the wood flake for core layers which applied the foaming nature binder on it was sprinkled so that the array direction of a wood flake might become in the array direction of the wood flake for surfaces, and the direction which goes direct. Furthermore, on it, the wood flake for the remaining surfaces was arranged and sprinkled in the wood flake and this direction for spraying ***** to the beginning, and it considered as the layered product of three layers. Heat-and-pressure simultaneous-for 20 minutes fabrication of the layered product was carried out by the temperature of 160 degrees C, and pressure 2MPa. The thickness of the obtained woody plate was 12mm, and density was 0.61 g/cm³.

[0031] (Example 4) The flexural strength and the bending Young's modulus of a woody plate of this invention which were produced in the example 3 were measured. About bending strength, it evaluated based on JIS-A5908. A result is shown in Table 1.

[0032] (Example 1 of comparison) About the plywood (density 0.58 g/cm³) which has the same thickness as an example 3, the same measurement as an example 4 was performed. A result is shown in Table 1.

[0033] (Example 2 of comparison) It is the conventional directivity wood flake collection board which carried out the forming unification of the wood flake with 2% of the weight of the un-foaming nature binder, and the same measurement as an example 4 was performed about the directivity wood flake collection board of the same thickness as the woody plate of an example 3. A result is shown in Table 1.

[0034] (Example 3 of comparison) While having the same thickness as the woody plate of an example 3, about the density woody fiber collection board (density 0.70 g/cm³), the same measurement as an example 4 was performed. A result is shown in Table 1.

[0035]

【表 1】

| | 実施例 4 | 比較例 1 | 比較例 2 | 比較例 3 |
|---------------|--------------------|--------------------|--------------------|--------------------|
| 曲げ強度 (MPa) | 5 8 | 4 6 | 4 3 | 4 2 |
| 曲げヤング係数 (MPa) | 64×10 ² | 54×10 ² | 56×10 ² | 35×10 ² |

These results show having the flexural strength to which the woody plate of this invention endures the conventional plywood, a directivity wood flake collection board, and a woody fiber collection board.

[0036] (Example 5) The woody plate with a thickness of 12mm which carried out the three-layer laminating was produced like the example 3 except having made the foaming nature binder which fabricates the directivity wood flake collection board which makes a core layer into 1:1 mixture of the water-soluble phenol resin which is an un-foaming nature resin, and the urethane resin (44V20, the Sumitomo Beyer company make) which is a foaming nature binder.

[0037] (Example 6) Lessons was taken from the woody plate of this invention produced in the example 3 and the example 5, the plywood of the examples 1-3 of comparison, the directivity wood flake collection board, and the woody fiber collection board, and the screw holding power of the direction of a flat surface and the direction of a cross section of wood was measured based on JIS. A result is shown in Table 2.

[0038]

【表 2】

| | 実施例 3 | 実施例 5 | 比較例 1 | 比較例 2 | 比較例 3 |
|----|-----------|-----------|-----------|-----------|-----------|
| 平面 | 5 3 k g 重 | 5 6 k g 重 | 4 4 k g 重 | 5 3 k g 重 | 4 6 k g 重 |
| 木口 | 3 6 k g 重 | 3 5 k g 重 | 3 4 k g 重 | 2 1 k g 重 | 3 2 k g 重 |

As for the woody plate of this invention, these results show equivalent or having the big screw holding power beyond it as compared with the conventional plate.

[0039] (Example 7) The value of deflection was performed based on JAS "flooring" about the woody plate of this invention produced in the example 3 and the example 5. For example, by JAS specification of flooring, the value of this deflection needs to be 3.5mm or less. Consequently, the deflection of 3.0mm and the woody plate of an example 5 is 3.3mm, and, as for the deflection of the woody plate of an example 3, was found by that all fulfill the flooring specification of JAS.

[Effect of the Invention] Since the laminating of the core layer which consists of a wood flake collection board which carried

out the forming unification of the wood flake using the foaming nature binder, and the surface which becomes the both sides from the directivity wood flake collection board which used and carried out forming unification in an un-foaming nature binder about a wood flake is carried out, the woody plate of this invention is high intensity, can be formed into low density and can obtain lightweight and the woody plate of high intensity. Moreover, by using the binder which mixed the foaming nature resin and the un-foaming nature resin by the specific ratio as a foaming nature binder, and carrying out the content of a binder within the limits of predetermined further, the woody plate of this invention can maintain high flexural strength, and the application to the use for which the plywood was used conventionally is also possible for it. Furthermore, insect control of a woody plate, an antiseptis, ** bacillus nature, and dimensional stability can be raised by acetylating the wood flake which makes a surface. According to the woody plate of this invention, the raw material conventionally used as scrap wood can be used effectively, and it is effective in protecting wood resources. Moreover, such a raw material is a low price and curtailment of raw material cost can also plan it.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] Especially this invention relates to the laminating wood quality board with a smooth front face which makes a core material the woody board which pasted up the wood flake with the un-foaming nature binder, and carried out forming unification about a woody board.

[0002]

[Description of the Prior Art] In recent years, shortage of wood resources and protection of a forest pose a problem, and the deforestation of a bird clapper is clearer difficult future still. Therefore, it is expected that the supply serves as instability or short supply, and, as for plates, such as a plywood manufactured using raw material wood in large quantities, a price also soars. Therefore, the woody board obtained using effectively the wood flake conventionally used as scrap wood, the woody fiber of the piece of wood, etc. attracts attention, and application to the various uses of the woody board is desired strongly.

[0003] Generally the woody board using a wood flake, woody fiber, etc. pastes up the component of a wood flake, woody fiber, etc. with a binder, carries out forming unification, and is formed. Although the woody board obtained becomes homogeneous and a front face also becomes smooth as the size of a component becomes small in that case, intensity and rigidity fall and density tends to increase. Then, in order to maintain the intensity of a woody board, when the board thickness was thickened, since it was high-density, the weight increased, and there was a problem of being hard coming to deal with it. [0004] In order to reduce the density of a woody board, when the amount of binders was decreased, the intensity of the woody board fell further, and was not able to be used for the use of which the high intensity of flooring etc. is required, and a comparatively big wood flake was used on the other hand and the amount of binders was decreased, the gap of a wood flake could not be filled but the problem that surface homogeneity fell was also produced.

[0005]

[Problem(s) to be Solved by the Invention] therefore, the technical problem in this invention -- from a directivity wood flake collection board -- becoming -- sufficient intensity and rigidity -- having -- in addition -- and a front face -- it is in offering a smooth woody board

[0006]

[Means for Solving the Problem] This technical problem is solvable with the woody board characterized by carrying out the laminating of the surface smoothing directivity wood flake collection board with which paste up a wood flake with a thickness of 0.4mm - 0.8mm with an un-foaming nature binder, it comes to carry out forming unification, and the density becomes both sides of the directivity wood flake collection board which is 0.60 - 0.85 g/cm³ from a wood flake with a thickness of 0.3mm or less.

[0007] Below, the woody board of this invention is explained in detail. Drawing 1 is drawing showing an example of the woody board of this invention, one in drawing is the core material formed with the directivity wood flake collection board which consists of a wood flake with a thickness of 0.4-0.8mm, and the laminating of the surface material 2 formed with the surface smoothing directivity wood flake collection board which consists of a wood flake with a thickness of 0.3mm or less is carried out to both sides of the core material 1.

[0008] The directivity wood flake collection board which forms the core material 1 of the woody board of this invention pastes up a wood flake with a thickness of 0.4-0.8mm with an un-foaming nature binder, and forming unification is carried out. It may not be restricted to 1 shaft orientations parallel to a longitudinal direction, but you may make it arrange in the biaxial direction which intersects perpendicularly mutually, and may make it arrange in the arbitrary directions respectively about the array direction of the wood flake in this directivity wood flake collection board. Although it is desirable that length is within the limits 20-100mm and whose width of face are 3-50mm as for the wood flake and flakes, such as a Japanese red pine, a larch, Picea jezoensis, Abies sachalinensis, Aspen, and a lodge pole pineapple, are used suitably, especially tree species are not restricted.

[0009] It pastes up with an un-foaming nature binder, and the forming unification of the wood flake with a thickness [this] of 0.4-0.8mm is carried out. The un-foaming nature binder used here is combining the wood flake mutually in a woody board. As an example of these un-foaming nature resins, a urea resin, melamine resin, phenol resin, polystyrene resin, an epoxy resin, polyvinyl chloride resins, or those mixture can be mentioned. Moreover, although the rate of the un-foaming nature binder to a wood flake can be suitably adjusted according to the density of the woody board made into the purpose, it is desirable to

consider as 5 - 40 weight section to the wood flake 100 weight section. If the rate of an un-foaming nature binder is less than 5%, even if the smooth nature and intensity of a woody board are inferior and it makes [more] it than 40%, so much, intensity will not improve but the density of a woody board will become large.

[0010] the density of the directivity wood flake collection board which makes this core material 1 -- 0.60 - 0.85 g/cm³ -- it is 0.64 - 0.75 g/cm³ preferably. Moreover, as for the bending Young's modulus, it is desirable to be referred to as 40-90x10²MPa. For example, if a bending Young's modulus becomes [a deflection] larger than the default value of JAS in less than 40x10² MPa and 90x10²MPa is exceeded when this woody board is used as flooring, the moderate elasticity needed at the time of a walk runs short.

[0011] A thin wood flake with a thickness of 0.3mm or less is arranged in the arbitrary directions, they paste up with a binder the surface smoothing directivity wood flake collection board which forms the surface material 2 of the woody board of this invention, and forming unification is carried out. In addition, what arranged in the fixed direction and was arranged is sufficient as the array direction of a wood flake with a thickness [this] of 0.3mm or less. When making a wood flake arrange in the fixed direction, it is desirable to make it arrange in the array direction of a wood flake with a thickness [in a core material] of 0.4-0.8mm and the direction which goes direct.

[0012] 20-50mm is used for length, and, as for a wood flake with a thickness [this] of 0.3mm or less, a 2-30mm thing is preferably used for width of face 2-60mm 20-100mm. If the thickness of this wood flake exceeds 0.3mm, the front face of the woody board obtained will not become smooth. As a wood flake with a thickness [this] of 0.3mm or less, although flakes, such as a Japanese red pine, a larch, *Picea jezoensis*, *Abies sachalinensis*, Aspen, and a lodge pole pineapple, are used suitably, especially tree species are not restricted.

[0013] As for a wood flake with a thickness of 0.3mm or less which forms this surface material 2, acetylating beforehand is desirable. When acetylating this wood flake, it is desirable to contact a wood flake with a thickness of 0.3mm or less with evaporation steams, such as an acetic acid, an acetic anhydride, and chloroacetic acid, and to acetylate it in a gaseous phase, after drying 3% or less of water contents until it becomes 1% or less preferably (the 12 - 20% of the degrees of acetylation).

[0014] It pastes up with a binder and the forming unification of the wood flake with a thickness of 0.3mm or less are thin of this surface material 2 is carried out. as a binder used for this surface material 2, an un-foaming nature binder which was mentioned above is sufficient -- although it may carry out and any of foaming nature binders or those mixture are sufficient -- practical -- fabrication -- public funds -- what is the point of the mold-release characteristic from type, and makes an un-foaming nature binder a subject is desirable. Those mixing ratios can be suitably set up in consideration of the density and the mold-release characteristic of surface material which are made into the purpose.

[0015] Here, it may become a foaming nature binder from the resin which carries out self-foaming, and may become it with the resin and foaming agent of un-foaming nature. A foaming nature polyurethane resin can be mentioned as an example of the resin which carries out self-foaming. As an example of the un-foaming nature resin to which it foams with a foaming agent, a polyurethane resin, polystyrene resin, an epoxy resin, a polyvinyl chloride resin, phenol resin, urea resins, or those mixture can be mentioned. moreover -- as a foaming agent -- an volatile foaming agent, for example, CCl₃F, CCl₂F₂, or CCl₂F-CClF₂ etc. -- a pyrolysis nature foaming agent, for example, an AZOJI carvone amide, azohexahydrobenzonitrile, and 2 and 2 - azo-isobutyro-dinitrile, a benzene sulfo hydrazide, or 'N, N' - dinitroso-N and N' - dimethylterephthalamide etc. can be mentioned.

[0016] Moreover, as for the rate of the binder to a wood flake with a thickness of 0.3mm or less in this surface material 2, it is desirable to carry out to more than 5 weight sections to the wood flake 100 weight section. If the addition of a binder is made below into 5 weight sections, the intensity of the obtained surface material will become inadequate. Moreover, the thickness of this surface material 2 is 1-5mm, and is preferably set to 1-2mm.

[0017] It is desirable to carry out the laminating of the surface material 2 of the same kind to both sides of the above-mentioned core material 1 with the woody board of this invention. Moreover, it is desirable to carry out dry type forming of what applied the binder to the wood flake with a thickness [for surface material] of 0.3mm or less, and the thing which applied the un-foaming nature binder to the wood flake with a thickness [for core materials] of 0.4-0.8mm, and to carry out simultaneous interweaving of it by heating under pressure. Specifically, first, on a heat-and-pressure board, as the wood flake is mostly located in a line in this direction, it sprinkles what applied the un-foaming nature binder to the wood flake with a thickness of 0.4-0.8mm which sprinkles what applied the binder to the wood flake with a thickness of 0.3mm or less it is thin to one surface material 2, next serves as a core material 1. Furthermore, what applied the binder to the wood flake with a thickness of 0.3mm or less it is thin to the surface material 2 of another side is sprinkled, and it considers as a three-layer layered product. Next, heat-and-pressure simultaneous fabrication of the heat and pressure is applied and carried out by the interweaving [by heating under pressure] in a plane at this layered product. As for the heat-and-pressure condition, it is desirable that a pressure considers as thickness (mm) x 5 - 120 seconds which 1 - 2MPa and temperature make 150-200 degrees C, and time makes the purpose.

[0018] If it is in the woody board of this invention, surface smoothing surface material may be further prepared in both sides of the woody board which consists of a core material mentioned above and surface material. Drawing 2 is drawing showing an example of such a woody board, the surface material 2 which becomes both sides of the core material 1 which consists of a directivity wood flake collection board from a surface smoothing directivity wood flake collection board is formed, and the laminating of the surface smoothing surface material 3 is further carried out to both the superficies.

[0019] As for this surface smoothing surface material 3, it is desirable to consist of an inside density woody fiber

accumulation board or an inside density wood flour fabrication board. These are the woody fiber accumulation boards which used as the raw material the wood flour which grinds the woody fiber or wood obtained by ****(ing) wood, and is obtained, pasted it up with the binder and carried out forming unification, and the thing of the high rigidity especially in inside density is desirable. As woody fiber which forms an inside [this] density woody fiber accumulation board, a wood chip is ****(ed) by the conventional method, it is obtained, the whole contains [the fiber length] fiber with a length of 3mm or more 50% or more preferably about 1-30mm, and that whose fiber width of face is about 0.1-2mm is desirable. The wood flour which makes an inside density wood flour fabrication board grinds wood, is obtained, and fine particles with a size of about 1.0-0.01mm are suitable for it. Moreover, as for the woody fiber or wood flour which forms this surface smoothing surface material 3, acetylating beforehand is desirable like a wood flake with a thickness of 0.3mm or less are thin of the surface material mentioned above.

[0020] The adhesion unification of the woody fiber or wood flour which makes this surface smoothing surface material 3 is carried out with the binder. As a binder used for this surface smoothing surface material 3, although any of an un-foaming nature binder, foaming nature binders, or those mixture are sufficient, what is the point of the mold-release characteristic from the metal mold for fabrication, and makes an un-foaming nature binder a subject is desirable practical. Those mixing ratios can be suitably set up in consideration of the density and the mold-release characteristic of the surface smoothing surface material 3 which are made into the purpose.

[0021] As for the rate of the binder to the woody fiber or wood flour in this surface smoothing surface material 3, it is desirable to carry out to more than 5 weight sections to woody fiber or the wood flour 100 weight section. If the addition of a binder is made below into 5 weight sections, a surface smooth effect will become inadequate. Moreover, the thickness of this surface smoothing surface material 3 is 1-5mm, and is preferably set to 1-2mm.

[0022] If it is in the woody board which has such surface smoothing surface material, as mentioned above, it is desirable to carry out the five-layer laminating of what applied the binder to the wood flake which makes a core material 1, the surface material 2, and the surface smoothing surface material 3, woody fiber, and wood flour respectively, it to carry out dry type forming, and to carry out simultaneous interweaving of it by heating under pressure. When using an inside density woody fiber accumulation board for the surface smoothing surface material 3, the application process of the binder to woody fiber May carry out by following the process mostly just before the process molded by heating under pressure, and After another facility performing this application process and making a different stage from the process molded by heating under pressure dry it, the method of making the so-called prepreg-like object which fiber was further twined at the needle-ized process and was formed in the shape of a sheet coalesce at the time of interweaving by heating under pressure is also used suitably.

[0023] In the core material of the woody board of this invention, the mixing ratio of an un-foaming nature binder is 5% - 40%, and the density is 0.60 - 0.85 g/cm³. Moreover, since the wood flake with a thickness of 0.4-0.8mm is mostly arranged in the same direction, the intensity of the array direction is large. Moreover, the laminating of the surface material which consists of a wood flake with a thickness of 0.3mm or less is carried out to both sides of a core material. Therefore, while intensity and rigidity improve, a front face becomes smooth, and it can be suitably used now also as flooring etc. moreover -- since forming unification is carried out in this woody board using the un-foaming nature binder -- fabrication -- public funds -- the mold-release characteristic from type is excellent Furthermore, the laminating of the surface smoothing surface material which consists of woody fiber or wood flour should be carried out, and especially surface smooth nature should be excellent in the woody board of this invention.

[0024] The woody board of this invention is concretely explained based on an example below.

(Example 1) As a material of the core material which consists of a wood flake with a thickness of 0.4-0.8mm, length produced the wood flake 5-50mm and whose thickness 75-80mm and width of face are an average of 0.55mm by the shaving machine (Product made from the Iwakura Group). When preparing the non-condensed urea resin 20 weight section, putting in the above-mentioned wood flake 100 weight section in the rotating drum rotated at a low speed and carrying out natural fall within a drum, the un-foaming nature binder was applied to the wood flake with a thickness of 0.4-0.8mm by sprinkling with a spray. The wood flake which makes surface material and 2-20mm and whose thickness 30-50mm and width of face are 0.15-0.20mm as a material of the surface smoothing directivity wood flake collection board which consists of a wood flake with a thickness of 0.3mm or less for length was produced by the shaving machine (Product made from the Iwakura Group). When preparing the water phenol binder 20 weight section, putting in the above-mentioned wood flake 100 weight section in the rotating drum rotated at a low speed and carrying out natural fall within a drum, the binder was applied to the wood flake with a thickness of 0.3mm or less by sprinkling with a spray.

[0025] First, the half of the wood flakes with a thickness of 0.3mm or less which applied the binder was sprinkled on the heat-and-pressure board, and the wood flake with a thickness of 0.4-0.8mm which applied the un-foaming nature binder on it was sprinkled so that the array direction of a wood flake might become in the about 1 direction. Furthermore, on it, the wood flake with a remaining thickness of 0.3mm or less was sprinkled, and it considered as the layered product with a thickness of 250mm. Heat-and-pressure simultaneous-for 20 minutes fabrication of the layered product was carried out by the temperature of 160 degrees C, and pressure 20 kg/cm² so that it might become 12mm in thickness. Thus, the front face of the fabricated woody board was smooth.

[0026] Thus, the density, the bending strength, and the bending Young's modulus of the produced woody board were measured. About bending strength, it measured based on JIS-A5908. Consequently, density was [58MPa(s) and the bending Young's modulus of 0.64 g/cm³ and bending strength] 61x102MPa(s).

[0027] (Example 1 of comparison) About the woody board of an example 1, and the plywood which has the same thickness, the same measurement as an example 1 was performed. Consequently, density was [49MPa(s) and the bending Young's modulus of 0.58 g/cm³ and bending strength] 52x102MPa(s). These results show that the woody board of this invention has a plywood and the rigidity more than equivalent.

[0028] (Example 2) The makeup veneer which consists of an oak sliced veneer with a thickness of 0.3mm was pasted up on it using water macromolecule isocyanate system adhesives (the Mitsuhiro industry, KR7800), having applied the temperature of 110 degrees C, and pressure 10MPa to one front face of the woody board produced in the example 1 for 3 minutes. Since the front face of a woody board was smooth, the makeup veneer was pasted up good. Furthermore, after grinding a front face, urethane paint of about 50-micrometer ** was given, and it considered as flooring. The appearance of the obtained flooring was smooth and good.

[0029] Furthermore, the deflection examination based on JAS was performed about this flooring. That is, it supported by span 700mm, having used the sample size as 300mm(width of face) x1800mm(length) x12mm (thickness), and the difference (A-B) of the variation rate (A) when applying the load of 21kg pile on the load rod which it intersected perpendicularly and was placed in the center of a span, and the variation rate (B) when applying the load of 9kg pile similarly estimated. It expresses that rigidity is so strong that this difference is small, and the value of this deflection needs to be 3.5mm or less by JAS specification of flooring. Consequently, the value of deflection was 2.6mm. Therefore, it turns out that the flooring of this invention has satisfied JAS specification of deflection, and it has sufficient rigidity to use it as flooring.

[0030] (Example 3) a wood flake with a thickness of 0.4-0.8mm it is thin of a core material like an example 1, and a wood flake with a thickness of 0.3mm or less are thin of surface material -- the 100 weight sections were prepared, respectively and the non-condensed urea 20 weight section and the water phenol binder 20 weight section were applied to each While using as surface smoothing surface material, as a raw material of a density woody fiber accumulation board the woody fiber (Canadian Forrest products company make --) which contains a thing with a fiber length of 3mm or more 50% or more 100 weight **** of F4-17 is carried out. The urethane-resin (rough MDI by Sumitomo Beyer urethane company) 10 weight section as a foaming nature binder, When preparing the mixture of the urea resin 10 weight section of a non-condensed type as an un-foaming nature binder, putting in woody fiber in the rotating drum rotated at a low speed and carrying out natural fall within a drum, the binder was applied to woody fiber by sprinkling with a spray.

[0031] First, the half of the woody fiber which applied the binder was uniformly sprinkled on the heat-and-pressure board, and the wood flake which applied the binder on it was uniformly sprinkled like the example 1, and carried out the laminating. Furthermore, the remaining woody fiber was sprinkled on it, and heat-and-pressure simultaneous-for 15 minutes fabrication of these five-layer layered products was carried out by the temperature of 150 degrees C, and pressure 2MPa so that it might become 25mm in thickness. Thus, the front face of the fabricated woody board was very smooth, and the specific gravity was [65MPa(s) and the bending Young's modulus of 0.64 g/cm³ and bending strength] 62x102MPa(s).

[0032]

[Effect of the Invention] Since the mixing ratio of an un-foaming nature binder is 5% - 40%, the density of the woody board of this invention is 0.60 - 0.85 g/cm³. Moreover, since the wood flake with a thickness of 0.4-0.8mm is mostly arranged in the same direction, intensity of the array direction can be enlarged. Moreover, if it is in the woody board of this invention, since the laminating of the surface smoothing directivity wood flake collection board which consists of a wood flake with a thickness of 0.3mm or less as surface material is carried out to both sides of a core material and simultaneous fabrication of the core material and surface material is carried out, even if partial hard and soft and thickness are in a core material, as the woody whole board, it is uniform, and a front face can be made smooth. Furthermore, smooth nature can be further raised by carrying out the laminating of the surface smoothing surface material which consists of a woody fiber accumulation board or a wood flour fabrication board. Therefore, it is fully applicable also to the use of which high rigidity, high intensity, and surface smooth nature, such as flooring, are required.

[0033] moreover, the woody board of this invention -- setting -- an un-foaming nature binder -- since forming unification is carried out using independent or the binder which made the un-foaming nature binder the subject -- fabrication -- public funds -- the mold-release characteristic from type is excellent Furthermore, in the woody board of this invention, insect control of a woody board, an antiseptis, ** bacillus nature, and dimensional stability can be raised by acetylating woody fiber and wood flour which make a wood flake with a thickness of 0.3mm or less are thin of surface material, and surface smoothing surface material. According to the woody board of this invention, the raw material conventionally used as scrap wood can be used effectively, and it is effective in protecting wood resources. Moreover, such a raw material is a low price and curtailment of raw material cost can also plan it.

[Translation done.]